Document title

OPTIQ® MDG LITE CLIENT SPECIFICATION

Document type or subject

MESSAGE SPECIFICATION

Revision number

Revision Number: 1.3

Date

Jun 2026

Number of pages

19

SBE Template Version

MDG Lite: 100

PREFACE

DOCUMENT HISTORY

The following table provides a description of all changes to this document.

VERSION NO.	DATE	CHANGE DESCRIPTION
1.0	July 2022	Optiq® MDG Lite Protocol and Message specifications
1.1	Oct 2022	Updated sections 1.3 – Updated description of MDG Lite services 1.5 – Updated *Price Update* in MDG Lite subscriptions.
1.2	Apr 2023	Updated sections 1.5 – Clarified content of Feed ID 2 for price levels based assets 2.2 – Updated description of MBP message sequence 2.4 – Added table describing the content of MDG Lite Snapshot 5.1.2 – Corrected Hearthbeat template ID
1.3	Jun 2026	2.5 – Added section related to MDG Lite Failover Scenario handling

REFERENCE MATERIAL

The following document, which either should be read in conjunction with this document or which provide other relevant information for the user:

- Euronext Markets – Optiq MDG Client Specifications

SUPPORT

Please find below the contact details:

Optiq Migration : optiqmigration@euronext.com

Belgium	+32 2 620 0585
France	+33 1 8514 8585
Ireland	+353 1 617 4289
Italy	+39 02 4541 1399
Netherlands	+31 20 721 9585
Norway	+31 20 721 9585
Portugal	+351 2 1060 8585
UK	+44 20 7660 8585

FURTHER INFORMATION

- For additional information please visit: www.euronext.com/optiq

CONTENTS

1.1. INTRODUCTION

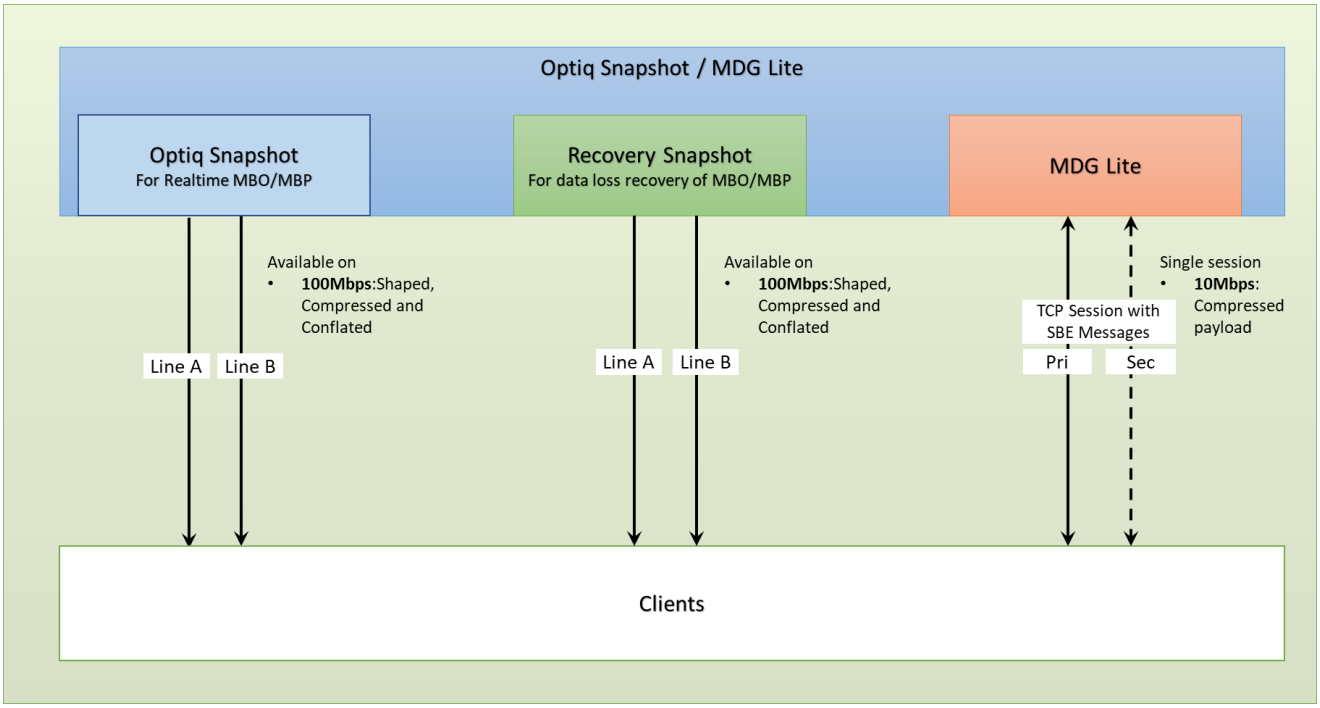
The Euronext **Optiq™ Snapshot Market By Order and Market by Price (MBO and MBP) feeds** provide a multicast stream of real-time pre-trade data in the form of consolidated book by orders and book by prices. These feeds are meant to complement the core Euronext Optiq MDG service which provides incremental, event-based, dissemination of the public order-book.

The Euronext **Optiq™ MDG Lite** provides high-speed, real-time market data for Euronext markets, and the delivery mechanism is based on TCP point-to-point connections. The payload of the market data is compressed to reduce the overall bandwidth utilization.

The Euronext Group plans to offer the Euronext Optiq Book Snapshot feeds and the Optiq™ MDG Lite services only for Italian traded asset classes, with the purpose of facilitating clients to migrate from the Borsa Italiana legacy market data solution to Optiq™ Trading Platform.

1.2. ACCESS TO MARKET DATA

Following is the overview of the services provisioned:



The **Optiq™ Snapshot Market by Order and Market by Price (MBO and MBP)** publish a limited depth snapshot of the order book. For Equity, Funds, Fixed Income and Warrants & Certificate markets the book snapshot is published at 150 millisecond intervals, whereas for derivatives markets the broadcast interval is configured at 900 millisecond intervals.
The book snapshot feeds are made available in two different formats: Market by order (MBO) and market by price (MBP), provisioned over two separate market data channels (i.e. two multicast groups)

1. **Market by order (MBO)** – the MBO snapshot product issues clients the top 10 individual orders for both the bid and offer sides of an order book for a given security.
2. **Market by price (MBP)** – the MBP snapshot product issues clients the top 10 price levels for both the bid and offer sides of an order book for a given security.

Only MBP service is made available for Warrants & Certificates and for derivatives markets.

The **Optiq™ MDG Lite service** provides TCP point-to-point access to market data. The messages payload is compressed in order to reduce the overall bandwidth consumption. This service targets those clients that are connected with low bandwidth profile, since the compound of data for all channels and all markets is expected to fit in a single 10Mbps access, provided that each channel is subscribed only once.

Based on the authorization profile defined on Exchange systems for the specific customer account, customers can subscribe the data from a combination of different data streams (*MDG Lite feeds*):

- Reference Data
- Full Trade Information and Statistics
- Full Order Book Update
- Best Bid and Offer Update
- Market By Price Snapshot Update

- Market By Order Snapshot Update

The subscription is issued by client at the logon phase, and it enables the client to receive an initial view of the data followed by realtime updates pertaining to the specific content.

1.3. CHANNEL TYPES AND CHANNELS IDS

The following market data services are made available to customers.

Aggregation	Asset Class Type	Optiq Market By Order (MBO)	Optiq Market By Price (MBP)	MDG Lite[1] for MBO and Full Book By Order	MDG Lite[2] for MBP, BBO and Full Book by Price
Italian Equities	Cash Equities	✓	✓	✓	✓
Italian ETFs	Funds	✓	✓	✓	✓
Italian Fixed Income	Fixed Income	✓	✓	✓	✓
Italian Warrantes & Certificates	Warrants & Certificates		✓		✓
EuroTLX Bonds Bond-X	Fixed Income	✓	✓	✓	✓
EuroTLX Certificates Cert-X	Warrants & Certificates		✓		✓
EuroTLX Equities	Cash Equities	✓	✓	✓	✓
GEM	Cash Equities	✓	✓	✓	✓
Trading After Hours	Cash Equities	✓	✓	✓	✓
Italian Commodities Derivatives	Commodities		✓		✓
Italian Equity Derivatives	Equity Derivatives		✓		✓
Italian Index Options	Index Derivatives		✓		✓
Italian Index Futures	Index Derivatives		✓		✓

For each Aggregation the following will be made available, depending on customer access profiles and asset classes:

- Market By Order (MBO) Realtime Multicast Feed
- Market By Order (MBO) “Recovery Snapshot” Multicast Feed
- Market By Price (MBP) Realtime Multicast Feed
- Market By Price (MBP) “Recovery Snapshot” Multicast Feed
- MDG Lite Service.

[1] Depending on the customer access profile of the market data client. Because MBO and Full Book are not available for Warrants, Certificates and Derivatives asst classes in Optiq MDG, these are also not available in MDG Lite
[2] Depending on the customer access profile of the market data client.

1.4. MARKET DATA MESSAGES PER CHANNEL

Message Name	Message type	Description
Start Of Day	1101	First message of the day sent by the Market Data Gateway
End Of Day	1102	Last message of the day sent by the Market Data Gateway
Health Status	1103	Heartbeat message sent at regular intervals throughout the day
Technical Notification	1106	Informs on the start or end retransmission
Timetable	1006	Scheduled Trading Mode and Phase Types for each instrument
Market Status Change	1005	Indicates the change in the state of an instrument (either scheduled or manually processed)
Standing Data	1007	Provides characteristics for all instruments on Cash
Contract Standing Data	1013	Provides characteristics for all contracts on Derivatives
Outright Standing Data	1014	Provides characteristics for all instruments on Derivatives
Strategy Standing Data	1012	Provides characteristics for all strategies on Derivatives
Market Update	1001	Provides information generated by market events, including limit updates and trades
Order Update	1002	Indicates new orders, modifications, cancellations or retransmissions
Price Update	1003	Provides all updated reference prices
LIS Package Structure	1016	Provides with the structure of an off book negotiated LIS Package
Full Trade Information	1004	Contains trade information, including all EU and UK MiFID II regulatory fields
Statistics	1009	Provides statistics on prices and volumes on an instrument
Start Of Snapshot	2101	Identifies the beginning of a snapshot sequence
End Of Snapshot	2102	Identifies the end of a snapshot sequence

1.5. MARKET DATA MESSAGES PER CHANNEL

	Multicast		MDG Lite						
	Multicast on 100 Mbps Shaped, Compressed		Pre Trade				Post Trade	Reference	
			5	4	3	2	1	0	Feed ID
	Market By Order Snapshot Update	Market By Price Snapshot Update	Market By Order Snapshot Update	Market By Price Snapshot Update	Best Bid and Offer Update	Full Book by Order/ by Price Update	Full Trade Information and Statistics	Reference Data	
Start of Day (1101)	X	X	X	X	X	X	X	X	
End of Day (1102)	X	X	X	X	X	X	X	X	
Health Status (1103)	X	X							
Technical Notification (1106)	X	X	X	X	X	X	X	X	
Timetable (1006)								X	
Market Status Change (1005)	X	X	X	X	X	X			
Standing Data (1007)								X	
Contract Standing Data (1013)								X	
Outright Standing Data (1014)								X	
Strategy Standing Data (1012)								X	
Market Update (1001)	X[3]	X[4]	X[3]	X[4]	X[3]	X[5]			
Order Update (1002)	X[6]		X[6]			X[5]			
Price Update (1003)	X	X	X	X	X	X	X		
LIS Package Structure (1016)							X		
Full Trade Information (1004)							X		
Statistics (1009)							X		
Start Of Snapshot (2101)	X	X	X	X	X	X	X	X	
End Of Snapshot (2102)	X	X	X	X	X	X	X	X	

[3] Only Best BBO. Fulll Depth Market Updates will not be provided

[4] Market Updates will be aggregated in snapshots with limited depth and distributed at regular intervals in MBP services. Please refer to How-To sections for a detailed description. Market Update Best Bid(1) and Best Offer(2) will not be provided

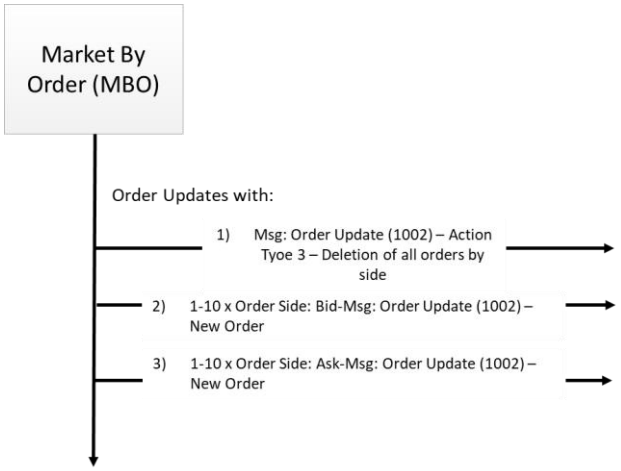
[5] Depending on Asset Class type, either the Order Update or the Market Update messages will be used to publish Full Book By Order or Full Book By Price updates respectively. Refer to section 1.3 to obtain the updates types applicable to each Asset Class type.

[6] Order Updates will be aggregated in snapshots with limited depth and distributed at regular intervals in MBO services. Please refer to How-To sections for a detailed description.

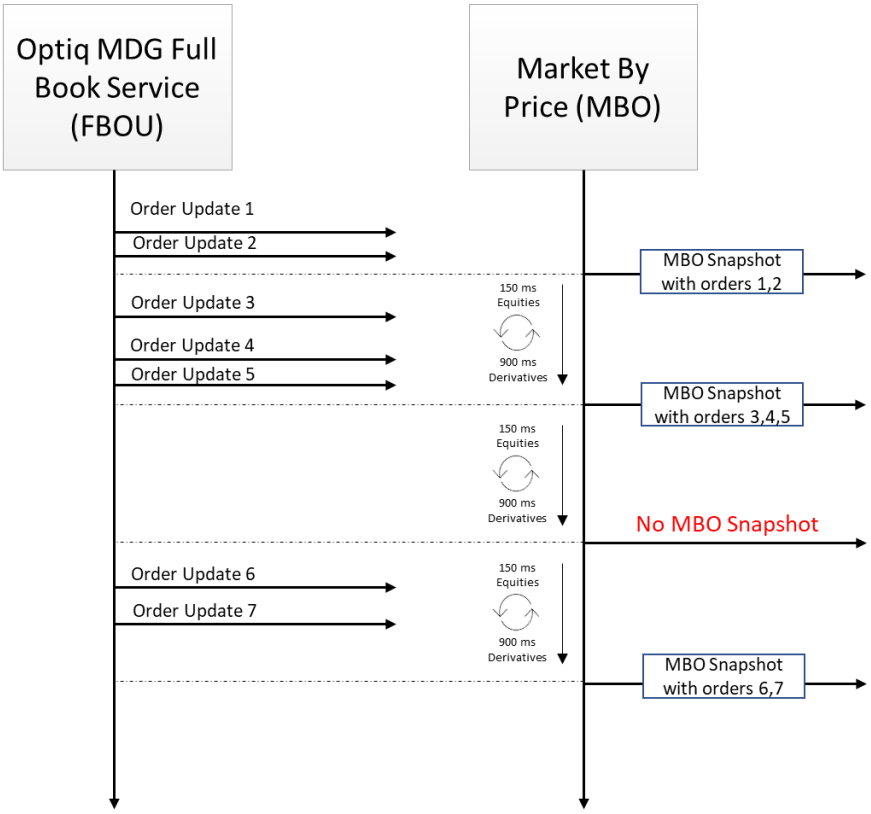
2. HOW TO…

2.1. … PROCESS ORDER BOOK ON MULTICAST MBO

For each traded product in the given market data channel, not having empty order book, the MBO feed publishes a sequence of orders at periodic intervals, up to a maximum of 10 bid orders and 10 ask orders. Each sequence starts with a clear book message (Order Update Message 1002 with Action type= 3) , to instruct the subscribed clients to clear the current book before processing the list of new orders. The sequence of orders in a single MBO snapshot is fescribed in the following diagram.

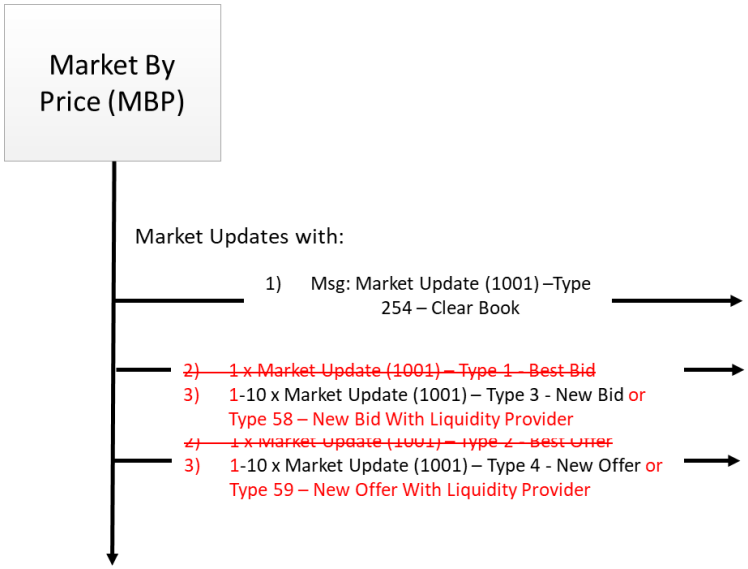


The MBO will publish a new book snapshot at the next interval, only if since the previous book snapshot there were updates on the traded order book within the first 10 Best Bid orders or 10 Best Offer orders, i.e. oly if the corresponding core Optiq MDG FBOU service has published Order Updates messages:

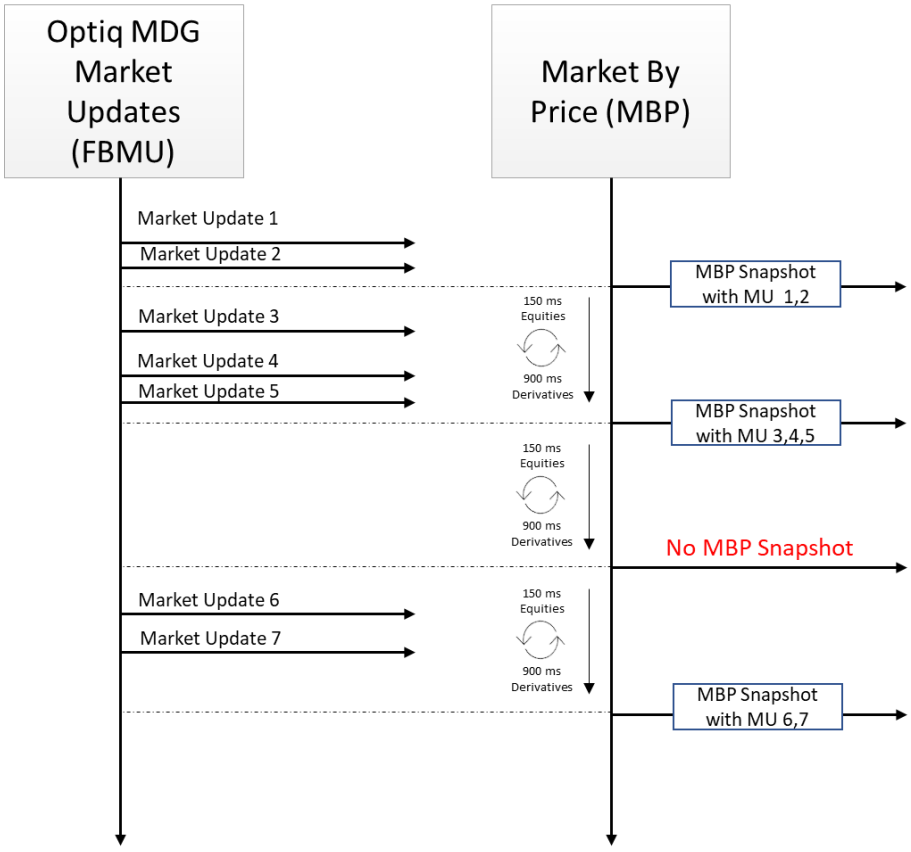


2.2. … PROCESS ORDER BOOK ON MULTICAST MBP

For each traded product in the given market data channel, not having empty order book, the MBP feed publishes a sequence of orders at periodic intervals, with a maximum of 10 bid price levels and 10 ask price levels. Each sequence starts with a clear book message (Market Update = 1001 with Type = 254), to instruct the subscribed clients to clear the current book before processing the list of subsequent price levels. The sequence of orders in a single MBP snapshot is fescribed in the following diagram.



The MBP will publish a new book snapshot at the next interval, only if since the previous book snapshot there were updates on the traded orderbook, i.e. only if on the correspohnding Market By Price service (Optiq MDG FBMU) new price levels were published within the first 10 levels Bids or Offers.



2.3. MDG Lite Logon Overview

Clients initiate a TCP/IP session to the MDG Lite Gateway, and then initiate a logon by sending the MDG Logon (1) message. Session Logon is always initiated by the client. The Logon (1) message must be the first message sent by the client otherwise the MDG Lite Gateway will drop the connection.

The MDG Logon message includes a repeating group through which the client can specify a combination of *MDG Lite feeds* which intends to receive.

A client has 30 seconds after they connect to send a logon request, otherwise the server drops the connection.

2.4. MDG Lite Data Synchronization Model

The MDG Lite service takes responsibility for the client to synchronize the current status of the public market data with subsequent market data updates.

After the MDG logon is successfully processed, provided that the client has the required permissions matching against the subscribed feeds, the system will start publishing for each feed the latest market data updates available identified by an initial Start of Snapshot (2101) message and a final End of Snapshot (2102) message.

As soon as the final End of Snapshot message is published for the subscribed feed, indicating that the latest state of market data was completely published, the connected client will start receiving realtime market data for the given feed.

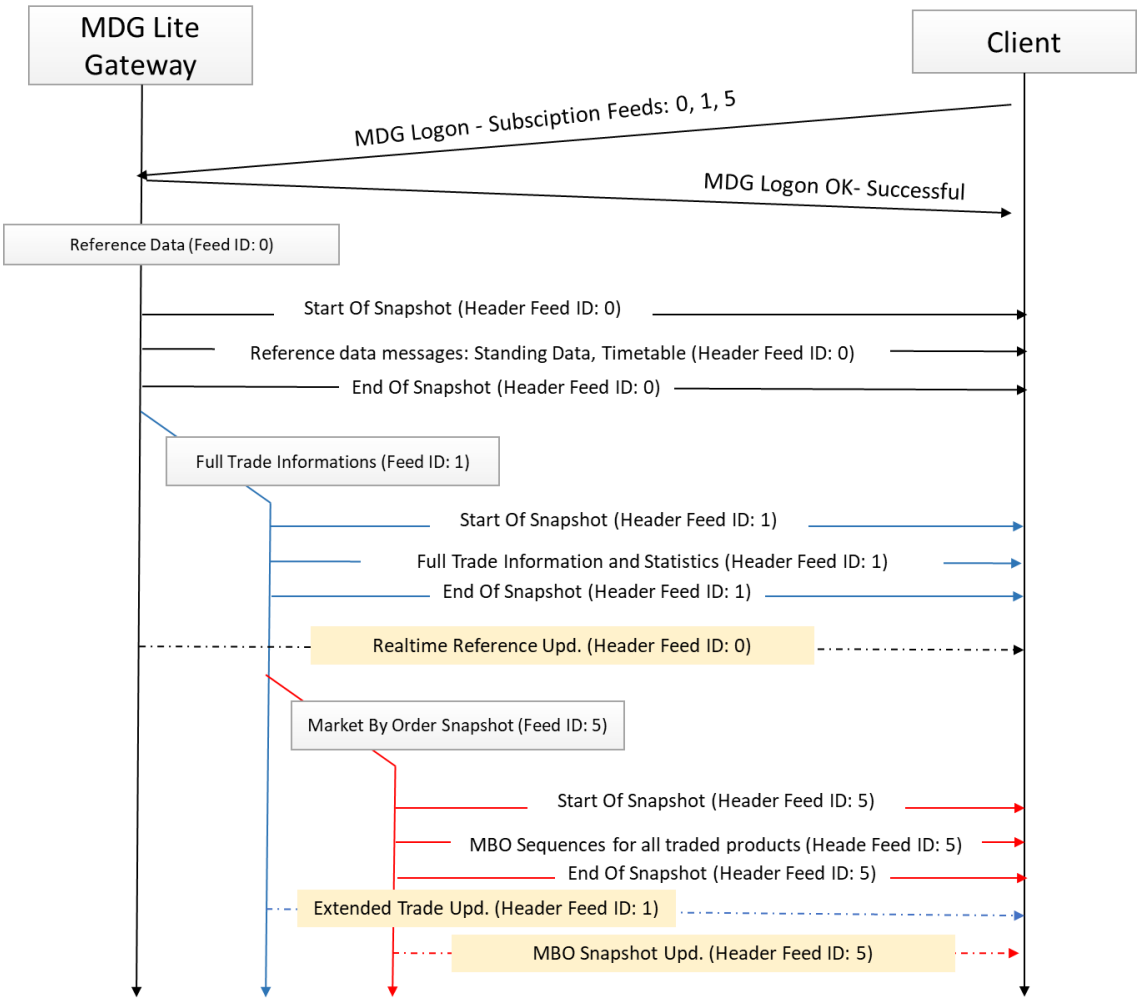
The messages returned within the initial snapshot sequence is indicated in the following table.

Message Name	Message type	Description	Applicable to MDG Lite Feed ID
Start Of Snapshot	2101	Identifies the beginning of a snapshot sequence	all
End Of Snapshot	2102	Identifies the end of a snapshot sequence	all
Timetable	1006	Only intraday updates to Timetable are returned. Full Timetable definition is available via Optiq file service.	0
Market Status Change	1005	Last Market Status Change update applicable to instrument and eMM is returned	2,3,4,5
Standing Data	1007	All standing data is returned per instrument	0
Contract Standing Data	1013	All standing data is returned per instrument	0
Outright Standing Data	1014	All standing data is returned per instrument	0
Strategy Standing Data	1012	All standing data is returned per instrument	0
Market Update	1001	Last Market Update per instrument and per type is published - Current displayable price levels are returned per instrument for market by price feeds	4 (2 for price level based asset types)

Market Update	1001	Last Market Update per instrument and per type is published - curret Best BBO is returned for BBO feed	3
Order Update	1002	Current displayable orders i Bid/Offer are returned per instrument - for market by order feeds	5,2 for order book based asset types
Price Update	1003	Last Price Update per type and per instrument is returned.	1,2,3,4,5
Full Trade Information	1004	Last 5 message per instrument from current trading day are published, if available.	1
Statistics	1009	Last statistic updates per instrument and statistic type are returned	1

Clients that intend to subscribe multiple feeds during Logon process, must note that the Start of Snapshot / End of Snapshot sequences are independently managed for each feed. It is possible that the MDG Lite gateway begins to publish realtime data for one feed, while for other feeds the publication of the initial snapshot sequence is still pending

The following diagram describes the scenario of a Client submitting Logon with subscriptions froups for the feeds IDs 0 – Reference Data, 1 – Full Trade Information and Statistics and 5 – Market By Order Snapshot Updates



2.5. MDG Lite Failover Scenarios

In the event of a forceful disconnection from the MDG Lite service, the expected behaviour is that the service is fully resumed once the client reconnects to an available MDG Lite Gateway. No specific recovery action is required from the downstream client other than restarting the connection to the service.
Following a disconnection event, the client should attempt reconnection according to the following sequence:

1. The client should first attempt to reconnect to the same MDG Lite Gateway.
2. If reconnection to the same gateway is not successful, the client should attempt to connect to the alternate MDG Lite Gateway within the same site.
3. If neither gateway within the same site is reachable, service may subsequently be resumed from the Disaster Recovery site, subject to the recovery of the underlying MDG Optiq service.

The following failover scenarios may be observed by the client:

1. The client is disconnected from the active MDG Lite Gateway and is able to reconnect to the same gateway after a short interval. This may occur in the event of a temporary issue affecting the active gateway, for example a transient interruption in connectivity to upstream market data sources or temporary gap handling.
2. The client is disconnected from the active MDG Lite Gateway and cannot reconnect to that gateway. In this case the client should attempt connection to the alternate gateway within the same site. This may occur in the event of a non-recoverable issue affecting the primary instance, for example a server failure.
3. The client is disconnected from the active MDG Lite Gateway and cannot reconnect either to that gateway or to the alternate gateway within the same site. In such circumstances the service may subsequently be restored from the Disaster Recovery site if the Optiq service is resumed there.

This description defines the expected client-facing service continuity behaviour in the event of gateway disconnection or failover. It does not imply that every service interruption is part of normal operating conditions.

2.6. Orderbook Snapshot MBO and MBP Protocol

MBO and MBP snapshot services will publish data in multicast UDP. The distribution protocol is implemented in the same way as Optiq MDG core services. Please refer to Optiq MDG specifications for further details.
To MBO and MBP snapshot services, the same SBE version of the core Optiq MDG is also applicable.

The resiliency model of MBO and MBP service will be implemented via two multicast group per each service, Primary and a Secondary multicast, one being the replica of the other. A Client can arbitrate between Primary and Secondary multicast group to recover temporary loss of multicast packets.

2.7. Recovery of MBO and MBP Data

In order to overcome the potential loss of UDP packets from both Primary and Secondary multicast groups, a “Recovery Snapshot” service is made available, providing a complete image of the market data at a giving time of the day. Each MBO and MBP channel has a matching snapshot channel.

An image sent in the Recovery Snapshot service is linked to the paired MBO and MBP with the Last Market Data

Sequence Number from the real time channel.

This broadcasted image of all channels is a snapshot sequence and cannot be sent more than 1 every 2 seconds.

2.8. MDG LITE PROTOCOL

MDG Lite service implements a dedicated packet structure, which include a TCP header and a MDG Lite Header.

<table>
<tr><td colspan="11">IP</td></tr>
<tr><td rowspan="2">Header IP</td><td colspan="10">TCP</td></tr>
<tr><td rowspan="2">Header TCP</td><td colspan="10">MDG Lite Packet</td></tr>
<tr><td rowspan="2">MDG Lite Header</td><td colspan="9">1st SBE Message</td><td rowspan="2">Next SBE Message(s)</td></tr>
<tr><td rowspan="2">Frame</td><td rowspan="2">SBE Header</td><td rowspan="2">Block</td><td colspan="6">Repeating Section 1</td></tr>
<tr><td>Repeating Section Header</td><td>Rep.Sec. 1.a</td><td>Rep.Sec. 1.b</td><td>…</td><td>Rep.Sec. 1.n</td><td>…</td></tr>
<tr><td>n bytes</td><td>20-40 bytes</td><td>15 bytes</td><td>2 bytes</td><td>8 bytes</td><td>n bytes</td><td>2 bytes</td><td>x_1 bytes</td><td>x_1 bytes</td><td>…</td><td>x_1 bytes</td><td>…</td></tr>
</table>

As for compressed Optiq MDG multicast channels, MDG Lite will use LZ4 compression in block mode with no headers. The compression mechanism is used to minimize the bandwidth utilization. Only the body of the MDG Lite Payload will be compressed, excluding the header. Each MDG Lite Packet will specify in the header if the payload is compressed or not.
Client can assume that all Technical messages exchanged between Client and the MDG Lite Gateway are not compressed, whereas all market data messages will have all packets compressed.

The maximum extracted packet size cannot be greater than 8192 bytes.

2.9. MANAGE SBE TEMPLATES

A client that which to process data from the MDG Lite Service, will need to refer to two separate SBE Templates. Both SBE templates should be used in conjunction to handle the Technical messages, and the market data updates:

- Optiq MDG SBE Template – in order to process all market data updates, the client should refer to the latest version of Optiq MDG SBE Template.
- MDG Lite Administration Message SBE Template – this template shall be used to process the Technical messages: MDG Lite Logon(1), MDG Lite Logon Ack (2) and MDG Lite Heartbeat (3)

2.10.MDG LITE HEADER

Field	Short Description	Format	Len	Values	Presence
Packet Time	Timestamp of the packet	Epoch Time in Nanoseconds	8	0..2^64-2	Mandatory
Packet Flags	Used to flag information (Little-Endian) Bit 0: Compression - 0 = body of the packet is not compressed (the body is the packet without the packet header) - 1 = body of the packet is compressed - Bit 1: is set to 1 when in the packet there is a Start Of Snapshot (2101) message, 0 otherwise - Bit 2: is set to 1 when in the packet there is an End Of Snapshot (2102) message, 0 otherwise - Bit 3: is set to 1 when in the packet there is a Snapshot message - Bit 4: is set to 1 when the packet contains the last message for the	Numerical	2	0..2^16-2	Mandatory
Packet Length	Length of the message except this header	Numerical	4	0..2^32-2	Mandatory
Feed Id	0 = Reference Data 1 = Full Trade Information and Statistics 2 = Full Order Book Update 3 = Best Bid and Offer Update 4 = Market By Price Snapshot Update 5 = Market By Order Snapshot Update For session-level messages, Logon, Logon-Ack and Heartbeat, which are not applicable to a specific subscription type, the value will be set to 99.	Numerical	1	0..2^8-2	Mandatory

3. MESSAGE OVERVIEW

MBO and MBP services are based on the same messages, data types and formats as Optiq MDG. Please refer to Optiq MDG documentation for information about data types and formats.

3.1. SEQUENCE NUMBERS

Optiq MDG implements two sequence numbers:

- A Packet Sequence Number (PSN) which is encapsulated in Market Data Packet Header
- A Market Data Sequence Number included in the SBE messages.

MBO and MBP Services will publish both a Packet Sequence Number (PSN) and a Market Data Sequence Number.

MDG Lite will provide only the Market Data Sequence Number via SBE messages payload.

4. MESSAGES

4.1. TECHNICAL MESSAGES

4.1.1. MDG LITE LOGON (1)

Field	Short Description	Format	Len	Values	Presence
MD Logical Access ID	Identifier of the MD Logical Access	Numerical	8		Mandatory
Subscriptions length		Numerical	1		Mandatory
Subscriptions occurrences		Numerical	1		Mandatory
MD Subscription	Subscription Map for select data streams 0 = Reference Data 1 = Full Trade Information and Statistics 2 = Full Order Book Update 3 = Best Bid and Offer Update 4 = Market By Price Snapshot Update 5 = Market By Order Snapshot Update	Numerical	1		Mandatory

4.1.2. MDG LITE LOGON ACK (2)

Field	Short Description	Format	Len	Values	Presence
MD Logical Access ID	Identifier of the MD Logical Access	Numerical	8	0..2^64-2	Mandatory
RejectCode	Provides the logon rejection reason.	Enumerated	1	(See field Description)	Mandatory

4.1.3. MDG LITE HEARTBEAT (106)

Both the MDG Lite gateway and the connected Client must send a **Heartbeat** (106) message after the given delay of inactivity on each side. The delayed is configured as n = 30 seconds.

During a period of inactivity when the MDG Lite gateway does not publish any data, the clients will receive at least one Heartbeat message every *n* second(s) when they are logged on.
The clients, on their side, must always send a Heartbeat every *n* second(s) to acknowledge that their session I still active. If the client does not send a Heartbeat within 2*n delay, it will be forcefully disconnected.

The message is only composed of an SBE Header.

5. FIELD DESCRIPTION

MDG LITE LOGON RESPONSE CODE

Field Name	MDG Lite Logon Response Code
Desription	Provides logon response
Format	Enumerated (unsigned integer 8)
Length	1
Possible Values	0 = The logon request has been accepted 1 = The logon request contains an unknown logicalAccessID. 2 = The logon request has been already accepted for that logicalAccessID. 3 = The system doesn't allow logon at that time. (For future use only) 4 = The logon request contains an invalid subscription. 6 = The user cannot subscribe a feed. 7 = User is suspended (by previous Admin intervention)